2.3.2 Public Access Street Flood Damage

The economic impact to public access streets along the study reach was evaluated based on the three floodplain management alternatives. The evaluation used a similar procedure as the public building flooding evaluation. ArcView was used with available GIS data from the City to calculate an approximate depth of flooding for each public access street within the 100-year floodplain. The annual flood damage was then estimated using the depth of flooding and a customized flood damage curve for street overtopping. The following paragraphs present the procedures and results of this analysis.

ArcView, a GIS software package, was used to divide and assign data to public access streets within the existing 100-year floodplain boundary. Each street was divided into 75-foot segments to more accurately assign a ground elevation and 100-year flood elevation. For each 75-foot street segment the nearest ground elevation contour and 100-year water surface elevation was assigned to calculate the depth of street flooding. The 0.5-foot rise and 1.0-foot rise floodplain management alternatives were then calculated by adding 0.5-feet and 1.0-feet, respectively, to the calculated depth for the no net rise/compensatory storage alternative. Figures 2-4, 2-5, and 2-6 present the results of this analysis graphically for the study reach.

As shown in Figures 2-4, 2-5, and 2-6, there was significant street flooding along the study reach. Under the existing City policy (Figure 2-6), approximately 68 percent of the streets within the 100-year floodplain boundary flood by more than 5-feet (shown in red), while 48 percent of the streets flood to that depth under the no net rise/compensatory storage alternative (Figure 2-4). The depth of street flooding for the three floodplain management alternatives was then used to estimate the annual flood damage.

Estimating potential annual flood damage to streets due to overtopping depth does not have a standard evaluation procedure as compared to building flooding. However, the concept of estimating annual flood damage based on depth was determined to be a reasonable method to evaluate the floodplain management alternatives. In addition, the Federal Highway Administration, Offices of Research and Development, has stated that there is a need for a more comprehensive record of flood related street and road damage, but to date this data does not exist. Therefore, a street flood depth damage curve was developed specifically for this project as a tool to compare the potential annual flood damage due to street overtopping.

Figure 2-7 displays the street flood depth damage curve developed for this project. Two recent events, the 2002 Flood of Interstate 80 near Ogalalla, Nebraska, and the 1999 Flood of Omaha, Nebraska were used to help approximate this curve. As the starting point for the curve, it was assumed that a street could flood by 6 inches without damage, which is consistent with bridge road deck overtopping evaluations. The depth damage curve was then used to estimate the potential annual flood damage for the three floodplain management alternatives.

The annual flood damage was estimated by multiplying the percent damage by the construction cost estimate to replace a typical urban street. Table 2-4 shows the results of the economic analysis, and Appendix A contains a spreadsheet of the detailed calculations. As Table 2-4 shows, the estimated annual flood damage cost for the no net rise/compensatory storage alternative is reduced by 27 percent from the existing City policy. For the 0.5-foot rise alternative the flood damage cost is reduced by approximately 14 percent compared to the existing City policy.